

Section 3.3: Polynomial Division; Remainder and Factor Theorems

Key points:

- Long division of polynomials: p. 281.
- Synthetic division: p. 284.
- The Remainder Theorem: p. 283.
- The Factor Theorem: p. 285.

Long division: *Must* be used if the divisor does not look like $(x - c)$.

Synthetic division: *May* be used if the divisor looks like $(x - c)$. The root of the divisor, the number c , goes “in the box”.

The Remainder Theorem: Suppose $f(x)$ is a polynomial and $(x - c)$ is a divisor. Then the remainder is $f(c)$. Use this idea along with synthetic division to find the value of a function quickly.

The Factor Theorem: Suppose $f(x)$ is a polynomial and the remainder $f(c)$ is 0. Then $(x - c)$ is a factor of f . Use this idea along with synthetic division to quickly factor a polynomial.

Roots and factors “go together”! If $x = c$ is any root/zero of a polynomial function f , then $(x - c)$ is a factor of f .